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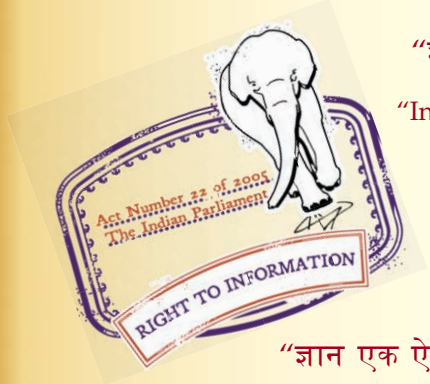
IS 8449 (1999): Non-returnable metal aerosol dispensers [MTD 32: Metal Containers]



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IS 8449 : 1999
(Reaffirmed 2000)

भारतीय मानक

अप्रत्यावर्त धातु एरोसोल वितरक — विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

NON-RETURNABLE METAL AEROSOL DISPENSERS — SPECIFICATION

(First Revision)

ICS 55.130

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 1999

Price Group 3

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft was finalized by the Metal Containers Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1977. While reviewing the standard, the committee decided to revise it to align with the present practices followed by Indian Industry and overseas countries.

Aerosol dispenser means any non-reusable container made of metal, glass or plastic and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder and fitted with release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state.

Aerosol dispensers offer many advantages for certain types of products such as perfumes, deodorant, shaving cream, insecticides etc. They permit controlled dispensing. They protect the contents from contamination and from oxidation by the atmosphere, down to the last drop. The product is converted to a spray, stream, or foam without effort on the part of the user. The size of spray particles and the pattern of the spray can be varied to suit a particular purpose and the usefulness and effectiveness of many products are enhanced when they are in aerosol form.

This standard covers aerosol dispensers made of metal. Emphasis has been laid on performance requirements rather than material specifications such as metal thickness and temper.

In this revision, following changes have been made:

a) Material clause has been modified.

b) Reference clause has been included.

c) Pressure unit has been changed to bar in line with EEC Directive 75/324/EEC.

Since many countries have statutory regulations concerning aerosols with which exporters to those countries are required to comply, it is suggested that such information should be obtained in advance.

Manufacture, possession and use of any gas when contained in cylinders in a compressed or liquefied state are regulated under *Gas Cylinder Rules*, 1940 of the Government of India. However the non-returnable aerosol dispensers up to 500 ml covered under this standard have been exempted by the Chief Inspectorate of Explosives in India from the purview of these rules. Dispensers above 500-ml capacity, have, therefore, to comply with the said rules, in addition to the technical requirements covered in this standard. This standard has been prepared in consultation and agreement with the statutory authorities under these rules.

In this revision, necessary assistance has been derived from EEC Directive 75/324/EEC.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

NON-RETURNABLE METAL AEROSOL DISPENSERS — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard specifies materials, construction and testing of non-returnable metal aerosol dispensers with a maximum internal pressure of 11 bar at 55°C.

NOTE — 1 bar = 1×10^5 Pa = 1×10^2 kPa = 1.020 kgf/cm^2

1.2 The maximum internal diameter and brimful capacity of the containers covered in this standard shall not exceed 65 mm and 1 000 ml respectively.

1.3 This standard deals only with the containers and not with the associated components, such as valves, spray heads, etc.

1.4 These containers are intended to be used for packing products only once and should under no circumstance be re-used.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
737 : 1986	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (*third revision*)
1993 : 1993	Single cold-reduced tinplate and single cold-reduced black plate — electrolytic and hot-dipped tinplate sheet and blackplate sheet (*third revision*)
8469 : 1977	Methods of tests for flammability of aerosol products
12313 : 1988	Hot dip terne coated carbon steel sheet
13954 : 1994*	Double cold-reduced electrolytic tinplate sheet

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Aerosol

Scientifically the term 'aerosol' is defined as 'a suspension of solid or liquid particles in a gas'. In popular usage and in the packaging industry, however, the term is used to describe a dispensing container, incorporating a valve which is kept under a greater pressure than atmospheric by means of a propellant (liquefied or compressed gas), and from which the product, and sometimes the propellant also, is discharged when the valve is opened by the user.

3.2 Aerosol Dispenser

A dispensing container incorporating a valve, but excluding the product, in which the product is to be kept under greater pressure than atmospheric by means of a propellant, and from which the product is dispensed by the propellant when the valve is opened by the user.

3.3 Unfilled Container

A container at the end of the manufacturing operations carried out by the container manufacturer.

3.4 Non-returnable Dispenser

A dispenser designed to be discarded when exhausted and not to be returned for re-filling.

4 MATERIAL

The container shall be made from any of the following materials provided the finished container is compatible with the intended contents:

a) Single cold-reduced electrolytic tinplate sheet conforming to IS 1993,

b) Double cold-reduced electrolytic tinplate sheet conforming to IS 13954,

c) Terne plate conforming to IS 12313, and

d) Aluminium sheet conforming to Grade 19500 of IS 737.

5 CONSTRUCTION

5.1 The construction of the container shall be either seamless or with seams welded, soldered, brazed, double seamed or swaged. Seams shall be made in accordance with accepted can making practice.

5.2 The aperture opening dimensions for the tinplate and aluminium aerosol dispenser shall be as shown in Fig. 1 and Fig. 2.

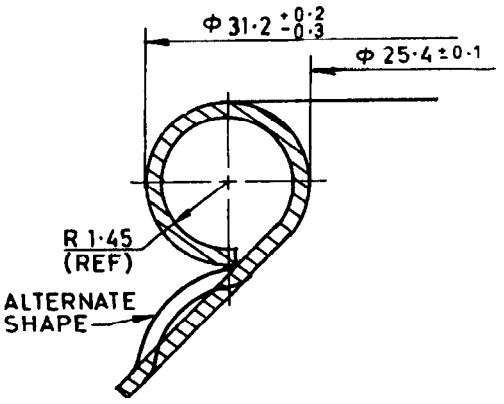
6 FINISH

6.1 Internal

The aerosol dispensers may be internally coated or otherwise surface treated with appropriate lacquers or by chemical treatment. Internal treatment shall be compatible with the intended contents.

6.2 External

The containers may be coated externally with lacquers or chemically treated or decorated with lithography. The material used shall withstand the hot water testing process specified under **9.1**.

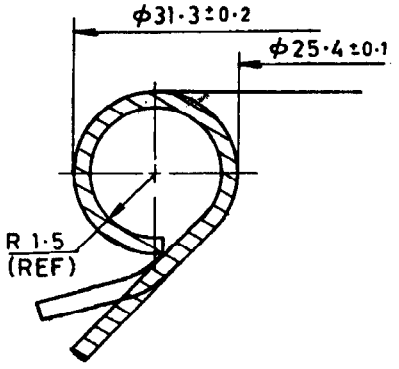


All dimensions in millimetres.

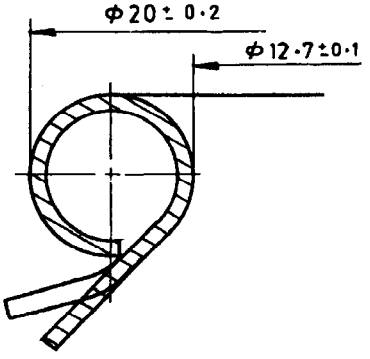
FIG. 1 APERTURE DIMENSIONS FOR φ 25.4 TINPLATE AEROSOL CONTAINER

7 FILLING VOLUME

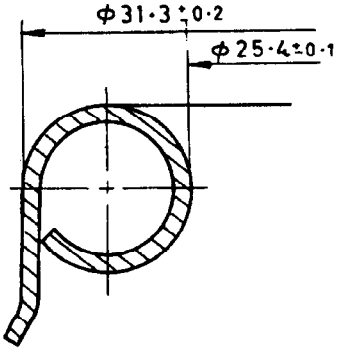
7.1 The total liquid (together with any solid) contents at a temperature of 55° C shall not occupy more than 90 percent of the internal volume of the closed dispenser except as specified in **7.2**.



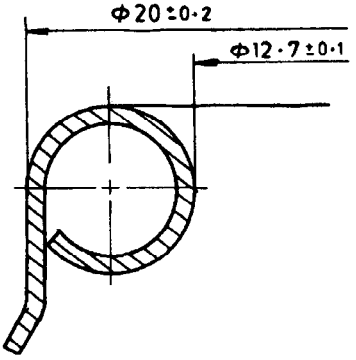
2A Aperture φ 25.4
Externally Curled



2C Aperture φ 12.7
Externally Curled



2B Aperture φ 25.4
Internally Curled



2D Aperture φ 12.7
Internally Curled

All dimensions in millimetres.

FIG. 2 APERTURE OF ALUMINIUM AEROSOL CONTAINER

7.2 For containers having a concave end with a radius of curvature less than the diameter of the body and where the end reverses before the container bursts where tested according to **8.2**, the total liquid together with any contents at a temperature of 55°C shall not occupy more than 95 percent of the internal volume of the closed dispenser.

8 TESTING OF UNFILLED CONTAINERS

8.1 Unfilled containers shall show no visible and permanent distortion when tested to the deformation test pressure. The deformation test pressure shall be 10 bar. The test shall be carried out in accordance with the method given in **8.3**.

8.2 Unfilled containers shall not burst when tested to the burst test pressure. The burst test pressure shall be 12 bar or as may be decided between the purchaser and the supplier. Any leakage shall be classified as a burst. The tests shall be carried out in accordance with the method given in **8.3**.

8.3 Test Method

The test container shall be pressurized hydraulically to the specified test pressure. The pressure shall be increased from atmospheric to the specified test pressure at an approximately constant rate over a period of 30 seconds to 3 minutes, disregarding temporary changes in rate due to deformation. The test shall be carried out at 20 ± 5°C.

Any leakage shall be classified as burst.

8.3.1 Any alternative procedures adopted shall not be less rigorous but the reference method shall be hydraulic.

8.4 Sampling

Unless otherwise agreed to, the method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Annex A.

9 TESTING OF FILLED DISPENSERS

9.1 Dispensers Other Than Those Covered in 9.2

All filled dispensers shall be totally immersed in a hot water test bath under conditions selected for the individual filled dispenser, so that the internal pressure in the all filled aerosol dispensers attains, as minimum, 90 percent of the pressure that would be attained in the same dispenser with the contents at 55°C. No dispenser shall show any signs of leakage, permanent distortion or other defects.

9.1.1 Any defective dispenser shall be rejected.

9.2 Dispensers for Certain Pharmaceutical Preparations

In the case of a pharmaceutical preparation, whose activity would be adversely affected by the temperature required by the test specified in **9.1**, all dispensers shall be leak tested in a water bath at 37°C and any defective dispenser shall be rejected.

9.2.1 In addition, at least one dispenser in 2 000 or at least one dispenser in each day's production shall be totally immersed in a hot water test bath under conditions selected for the individual filled dispenser so that the internal pressure in it attains, as minimum 90 percent of the pressure that would be attained in the same dispenser with the contents at 55°C. The dispenser shall show no signs of leakage, permanent distortion or other defect.

9.2.1.1 If the test dispenser fails:

a) The lot shall be deemed not to comply with this requirement, or

b) Subject to agreement between the manufacturer and the purchaser, 10 additional dispensers may be selected at random and subjected to the test under which failure occurred. Should any of the 10 dispensers fail, the entire lot shall be deemed not to comply with this requirement.

9.2.1.2 The test dispensers shall be discarded.

NOTE — The test calls first for the determination of the equilibrium pressure at 55°C in a filled test dispenser, followed by determination and maintenance of appropriate bath conditions (test bath agitation, residence time etc, having regard to dispenser size, construction etc).

9.3 Flammability Test

The flammability of aerosol products shall be determined by the methods given in IS 8469. All the three tests shall be used for each type of formulation tested. The products shall be graded combustible, flammable or highly flammable accordingly.

10 PRECAUTIONS IN TESTING AND FILLING

10.1 The tests required under **8** and **9** are designed to subject containers to higher pressures than those normally expected, and/or to detect gross overfilling. It is essential that precautions should be taken to safeguard operators carrying out these tests. Such precautions include wearing shatterproof goggles, hand gloves etc.

10.2 Care should be taken to reduce the inclusion of air from the aerosol container during the pressure filling. The presence of air in aerosol container is undesirable for the following reasons:

a) It increases the internal pressure of the container,

b) It changes the desired spray pattern, and

c) Oxygen in the air increases the corrosion hazards

with any product, especially with products based on water.

Some of the common methods employed to reduce air inclusion during filling are given in Annex B.

11 INFORMATION TO BE SUPPLIED BY THE PURCHASER AND THE MANUFACTURER

11.1 At the time of making an enquiry or placing an order, the purchaser shall inform the supplier of the number of Indian Standard specification to which the enquiry or order refers, and of the pressure range for which the container is to be used, and provide any other information which may affect the details of manufacture.

11.2 The formulator and/or the filler, when not the purchaser, shall ensure that this information is passed through the purchaser to the manufacturer. The manufacturer, when supplying containers, should inform the purchaser of the specification to which they are supplied, and of any changes which have been made in the construction, material, etc, since the previous delivery.

12 LABELLING OF THE FILLED DISPENSERS

12.1 Each filled dispenser shall bear, in a manner that will remain clear and legible throughout its expected life, the following:

a) The minimum cautionary notice worded as under:

'THIS CONTAINER IS PRESSURIZED. KEEP AWAY FROM HEAT, INCLUDING THE SUN. DO NOT PUNCTURE OR INCINERATE EVEN WHEN EMPTY. KEEP AWAY FROM CHILDREN.'

b) Any instructions or special warnings specially related to the product, for example, use only as directed, intentional misuse of deliberately concentrating and inhaling the contents can be harmful or fatal.

12.2 All filled dispensers shall bear a precautionary word or phrase, indicating, where necessary, the flammability of the spray that is emitted when the valve is operated.

13 MARKING

13.1 All aerosol dispensers shall be marked suitably with the following information.

a) Name, trade-mark or identification mark of the manufacturer; and

b) Date of manufacture given in code or in full.

13.2 BIS Certification Marking

The aerosol dispenser may also be marked with the Standard Mark.

NOTE — The dispensers, if covered under Standard Mark, shall be marked in such a way that the marking on the container is not construed as covering the contents of the filled dispenser.

13.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 8.4)

SAMPLING AND CRITERIA FOR CONFORMITY

A-1 LOT

All the aerosol dispensers manufactured from the same material and of same size, design, construction and finish, manufactured successively shall be grouped together to constitute a lot.

A-1.1 In order to ascertain the conformity of the lot to the requirements of this standard sample shall be drawn from each lot separately and inspected.

A-1.2 The number of dispensers to be drawn shall be in accordance with Table 1.

A-1.3 Criteria for Conformity

The number of containers as indicated against first sample in column 3 of Table 1 shall be inspected for finish, filling volume and performance tests. Any container not meeting the requirements of the relevant clause in the standard shall be considered defective. The lot shall be considered conforming to the requirements of the standard if the number of containers found defective in the first sample are less than or equal to the corresponding acceptance number given in column 4 of Table 1 against the first sample. The lot shall be considered not meeting the requirements of this standard if the number of containers failing to meet the requirements of the relevant clause are greater than or equal to the corresponding rejection number given in column 5 of Table 1 against the first sample. In case the number of defective containers lie between the acceptance and rejection number given in column 4 and 5 of Table 1 respectively, a second sample of the same size as the first shall be drawn and inspected. The lot shall be considered conforming to the requirements of the standard if the number of defective containers in the first and second samples taken together does not exceed the acceptance number given against the second sample. The lot shall be rejected if the number of defective containers is greater than or equal to the rejection number given in column 5 of Table 1.

Table 1 Sample Size and Criteria for Conformity

(*Clauses* A-1.2 *and* A-1.3)

Lot Size	Sample	Sample Size	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)
Up to 150	First	13	0	2
	Second	13	1	2
151 „ 300	First	20	0	3
	Second	20	3	4
301 „ 500	First	32	1	4
	Second	32	4	5
501 „ 1 000	First	50	2	5
	Second	50	6	7
1 001 „ 3 000	First	80	3	7
	Second	80	8	9
3 001 „ 10 000	First	125	5	9
	Second	125	12	13
10 001 and above	First	200	7	11
	Second	200	18	19

ANNEX B

(*Clause* 10.2)

METHODS OF AIR REMOVAL DURING PRESSURE FILLING

B-1 The methods as given in **B-1.1**, **B-1.2** and **B-1.3** are recommended to reduce the air inclusion during the filling of the aerosol containers.

B-1.1 Spraying of Inverted Container After Filling and Swaging

The filled dispenser is put in inverted position and the valve is pressed open till the liquid particles in the spray are exhausted and only the propellant is coming up. Keeping the valve open for a short while further would ensure the discharge of air along with the propellant vapours in the aerosol container. This method is applicable only in small scale production.

B-1.2 Vacuum Swaging

The method involves the closing and swaging of the aerosol container in vacuum after the product is filled into it. The efficiency of this method depends upon the efficiency of the system of maintaining vacuum and the maintenance of the vacuum swager. This method is not applicable when highly volatile solvents or foam products are involved.

B-1.3 Propellant Purging

This method involves the introduction of a few drops of propellant (R-11/12), which because of its high density displaces air from the container. This is the most efficient method of air removal and can be employed in the following three ways:

a) *Liquid propellant purging* — Whereby several grams of liquid propellant are introduced on to the concentrate surface and allowed to evaporate prior to swaging. Turbulence of the evaporating material tends to render this process less efficient than vapour purging mentioned in (b) and (c).

b) *Vapour purging* — Whereby several grams of propellant vapours are introduced into the can headspace at liquid surface level of the product prior to swaging.

c) *Double purging* — Whereby the empty can is purged prior to filling with concentrate and the headspace is purged after concentrate filling. This double process can be carried out with either several grams of liquid propellant or several grams of propellant vapour.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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